

prised that we encountered relatively few thrushes on or near the ground, despite the number and diversity of flight-calls from thrushes passing overhead. We are unable to explain why few thrushes landed during this event while so many warblers and other species were grounded.

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## Yellow-throated and Red-eyed Vireos Foraging on Green Anoles During Migration

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**ABSTRACT.**—Yellow-throated (*Vireo flavifrons*) and Red-eyed vireos (*V. olivaceus*) were observed feeding on green anoles (*Anolis carolinensis carolinensis*) at two localities in Florida and one in South Carolina. Vireos are long-distance migrants that require foods high in fatty acid content, especially when engaging in migration. It is not unlikely that vireos have an opportunistic foraging strategy to obtain the necessary food requirements, including attacking and consuming prey items such as small lizards. This note provides the first published reports of lizards taken as prey by these two species. Received 24 November 2006. Accepted 20 March 2007.

The diets of North American vireos have been well described (Chapin 1925, Tyler 1950, Williamson 1971, Graber et al. 1985,

Ridgely and Tudor 1989, Rodewald and James 1996, Cimprich et al. 2000). The diet of the Yellow-throated Vireo (*Vireo flavifrons*), based upon analysis of 160 stomachs from specimens collected from April through September in breeding areas throughout North America, consists of 98.3% animal matter and 1.7% plant material (including small fruits and seeds). Insects (Insecta; eggs, instars, and adults of at least five Orders) comprise 95.8% of the animal food with the remainder being spiders (Arachnida) 2.4% and small snails (Mollusca) 0.06% (Chapin 1925). Butterflies and moths (Lepidoptera) accounted for 42%+ of the insects taken and vegetable matter was primarily consumed in fall and winter (Chapin 1925, Rodewald and James 1996). The diet of the Red-eyed Vireo (*Vireo olivaceus*) has been summarized by Chapin (1925), Tyler (1950), and more recently by Cimprich et al. (2000). Food items consist of insects (Insecta; eggs, instars, and adults of at least eight Orders), spiders (Arachnida), small snails (Mollusca), a large variety of small fruits, and occasion-

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ally flowers and leaf buds (Chapin 1925, Cimprich et al. 2000). Contents of 569 stomachs (Apr–Oct) within the breeding range included 85% animal matter and 15% plant material (Chapin 1925). Small fruits were most frequently taken in late summer and fall in breeding areas (Chapin 1925, Tyler 1950, Williamson 1971, Graber et al. 1985). The species is almost entirely frugivorous while wintering in northern South America (Ridgely and Tudor 1989).

Vireos kill larger prey by crushing, shaking vigorously, or beating against a branch (Southern 1958, Rodewald and James 1996). Smaller prey is swallowed whole. Larger prey are held with a foot against a branch and eaten piecemeal (Williamson 1971, Rodewald and James 1996). The objective of our paper is to report two species of vireos feeding on *Anolis* lizards during migration in South Carolina and Florida, USA.

#### OBSERVATIONS

On 21 September 2006, while searching for neotropical migrants in the maritime forest at Myrtle Beach State Park, Horry County, South Carolina, PWS observed an adult Red-eyed Vireo feeding on a brown-colored green anole (*Anolis carolinensis carolinensis*). This abundant small arboreal lizard has: (1) the ability to change color (green to brown and vice versa), (2) a wide range in the south-eastern United States, and (3) attains a length up to 19 cm, 60–65% of this length being the tail (Conant 1958). The bird had apparently just captured the anole, ~ 12–13 cm in length and still limp, but the event was not witnessed. The bird held the lizard with its left foot against a branch and was steadily pecking the head, removing and swallowing small pieces of tissue. PWS watched this procedure for 15+ min with binoculars at an estimated 6 m with the bird clearly illuminated in direct sunlight. The bird was perched in a sweetgum (*Liquidambar styraciflua*) at a height of 5 m. The body and head of the anole were still intact, further indicating recent capture. When the vireo changed position on the branch, it continued to hold the anole with its left foot. When PWS left the site, the vireo was still actively feeding on the anole.

LSA and RLP observed a migrant Yellow-throated Vireo eating a green anole at 0900

hrs EDT at Key West, Monroe County, Florida on 13 April 1987. The vireo, perched in a strangler fig (*Ficus aurea*), was observed feeding on the lizard for 35 min. It first pulled pieces of flesh from the head, eating the eyes and what appeared to be the brain. After tearing the remains of the head from the body and dropping the head to the ground, the bird fed on the tissue of the neck region. The vireo bit off the legs and tail, and discarded them while feeding on the anole's abdomen. LSA later watched a migrant Red-eyed Vireo for 5+ min at 7 m eating a green anole at Ft. DeSoto County Park (Mullet Key), Pinellas County, Florida in mid morning on 27 April 1987. The bird was perched 3 m above ground in a woman's tongue tree (*Albizia lebbek*).

#### DISCUSSION

These appear to be the first reports of Yellow-throated and Red-eyed vireos feeding on lizards; literature searches did not reveal reptiles or amphibians having been reported taken by these two species. There is a record of a White-eyed Vireo (*Vireo griseus*) feeding on a small *Anolis* (Chapin 1925, Hopp et al. 1995). This appears to be the only previously published account of a vireo feeding on a lizard. Prior to the 1987 observations, the late Larry Hopkins (pers. comm., with LSA) reported watching a migrant Yellow-throated Vireo feeding on an introduced Cuban brown anole (*Anolis sagrei sagrei*) (Conant 1958) at Ft. DeSoto County Park, Pinellas County, Florida. All three vireos are long-distance migrants that possess the ability to greatly increase fat stores in preparation for migration (i.e., become hyperphagic), especially before a trans-Gulf flight (Moore et al. 1995). The energetic costs of migration require high levels of fatty acid in the diet of Red-eyed Vireos (Pierce and McWilliams 2005). Moreover, numerous nutritional requirements of individual vireos during the breeding season (Pierce et al. 2004, Pierce and McWilliams 2005) likely result in these species exhibiting opportunistic foraging behavior. Vireos are almost completely insectivorous requiring at least 75–85% animal matter in their diets (Cimprich et al. 2000, Pierce and McWilliams 2005). Red-eyed Vireos in laboratory tests routinely chose diets with higher fatty acid content (Cimprich et al. 2000, Pierce et al. 2004). Thus, it is like-

ly that vireos will attack and consume numerous animal species, including small lizards, when the opportunity arises.

Two of the vireos we observed (Apr) were in migration. One vireo observed (Sep), was likely preparing for migration to wintering areas in South America. It is likely the three birds were in an energetic state that required a highly nutritious food resource. Vireos are known to be opportunistic foragers during migration (Woodrey and Moore 1997). It is possible that at least the two species of vireos we observed take small lizards as prey with greater frequency than current evidence indicates. We did not observe captures of the lizards by the vireos and do not know the specifics as to how vireos actually obtained these prey, the physical condition of the prey at time of capture, or other circumstances involved.

Recent accounts of other small insect-eating birds taking small vertebrate prey include: (1) a migrant Summer Tanager (*Piranga rubra*) at Horn Island off the coast of Mississippi on 3 April 1993 eating a green anole (Aborn and Froehlich 1995), and (2) a House Wren (*Troglodytes aedon*) eating a juvenile house gecko (*Hemidactylus frenatus*) in Golfito, Costa Rica on 22 May 2002 (Barquero and Hilje 2005).

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